

Stated Meeting, Nov. 7.

Present, twenty members.

Dr. FRANKLIN BACHE, Vice-President, in the Chair.

Letters were received and read:—

From the Central Committee of Statistics of Belgium, dated Brussels, 6th April, 1845:—

From the Minister of Finance of Russia, dated St. Petersburg, 23d October, 1844, respectively announcing donations to the Library:—

From A. T. Kupffer, dated St. Petersburg, 15–27th October, 1844, accompanying a donation to the Library, and asking of the Society to send their publications in exchange:—

From M. Gustave d'Eichthal, dated Paris, 7th July, 1845, announcing a donation to the Society:—

From Col. Jos. G. Totten, dated Washington, 3d November, 1845, announcing a donation to the Society:—

From F. Fraley, Esq., dated Philadelphia, 17th October, 1845, in reference to the obituary notice of Professor Keating: and,—

From Dr. Ducatel, dated Baltimore, 20th October, 1845, asking to be excused from the duty of preparing an obituary notice of the late Mr. Nicollet.

The following donations were announced:—

FOR THE LIBRARY.

Observations made at the Magnetical and Meteorological Observatory, at Toronto, in Canada. Printed by order of Her Majesty's Government, under the superintendence of Lieut. Colonel Edward Sabine, of the Royal Artillery. Vol. I. 1840, 1841, 1842. London, 1845. 4to.—*From the British Government, through the Hon. Edward Everett.*

Statistique de la Belgique. Population. Mouvement de l'Etat Civil pendant l'année, 1843. Publié par le Ministère de l'Intérieure, (M. Nothomb.) Bruxelles, Décembre, 1844 Folio.—*From the Belgium Central Commission of Statistics.*

Annales des Mines. Rédigées par les Ingénieurs des Mines. Qua-

- trième Série. Tome VII. 1^{re} livraison de 1845. 8vo.—*From the Engineers of Mines, Paris.*
- Journal Asiatique. Quatrième Série. Tome V. No. 24. Juin, 1845. 8vo.—*From the Asiatic Society of Paris.*
- The Twelfth Annual Report of the Royal Cornwall Polytechnic Society, 1844. 8vo.—*From the Society.*
- The American Journal of Science and Arts. Vol. XLIX. No. 2. October, 1845. 8vo.—*From the Editors.*
- The African Repository and Colonial Journal. Vol. XXI. November, 1845. No. 11. 8vo.—*From the American Colonization Society.*
- The Medical News and Library. Vol. III. November, 1845. No. 35. 8vo.—*From Messrs. Lea & Blanchard.*
- Journal of the Franklin Institute of the State of Pennsylvania. Third Series. Vol. X. October, 1845. No. 4. 8vo.—*From Dr. R. M. Patterson.*
- Papers on Practical Engineering. No. 3. Sustaining Walls: Geometrical Constructions to determine their thickness under various circumstances. Derived chiefly from a Memoir of M. Poncelet, with modifications and extensions, by Lieut. D. P. Woodbury, under the direction of Col. J. G. Totten, Chief Engineer. Washington, 1845. 8vo.—*From Col. Totten.*
- The Latitude of Cambridge Observatory, in Massachusetts, determined from transits of stars over the prime vertical, observed during the months of December, 1844, and January, 1845, by W. C. Bond, Major James D. Graham, Geo. P. Bond, and Benjamin Peirce. 4to. Published in the Memoirs of the American Academy, Boston.—*From Major J. D. Graham.*
- Études sur l'Histoire Primitive des Races Océaniques et Américaines. Par Gustave d'Eichthal. Extracted from the Memoirs of the Ethnological Society of Paris. 8vo.—*From the Author.*
- A Lithographic impression of the Fossil Animal named Missouriium theristocaulodon. Published in Leipzig and Dresden.—*From Dr. Koch.*

ADDITION TO THE LIBRARY BY PURCHASE.

- Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences. Par MM. les Secrétaires perpétuels. Tome XX. Nos. 25, 26. Tome XXI. Nos. 1 to 8, inclusive. 4to.
- Astronomische Nachrichten. Nos. 545, 546, 547. 4to.

The Committee on Major Jas. D. Graham's paper, entitled "Observations for the Magnetic Dip, made at several positions, chiefly on the South-Western and North-Eastern frontiers of the United States; and of the Magnetic Declination at two positions on the river Sabine, in 1840, by Major Jas. D. Graham," reported an abstract made by the author, and recommended its publication in the Transactions, which was ordered accordingly.

The observations of the magnetic dip and declination, from the 29th of January to the 5th of June, contained in this paper, were made while Major Graham was attached to the joint commission for the demarcation of that portion of the boundary between the United States and Texas, included between the mouth of the river Sabine and its intersection with the 32° of north latitude. The observations for the dip, subsequent to that period, were made while he was serving as a commissioner on the part of the United States for the survey and exploration of the territory then in dispute with the government of Great Britain upon our north-eastern frontier.

The only apparatus in possession of the commission for the demarcation of the boundary line between the United States and Texas, that could be applied to the determination of the declination, consisted of the surveyor's compasses furnished for the survey, and the needle of a theodolite. Although a good variation transit would have been preferred for this purpose, yet the want of such an instrument was in a great measure compensated for, by the use of three different needles instead of one. These were observed on with the poles direct and then again with the poles reversed. In every instance the errors of the instrument were compensated as far as practicable by noting the readings of both ends of the needles, and by reversing the direction of the vanes of the compasses, and then making another set of readings in the same manner. When the theodolite needle was observed upon, both ends were read before and then again after a reversal by a horizontal motion of the azimuth plate: and a mean of all the separate results was adopted for the correct declination at each station.

The observations for the magnetic dip were made with an instrument constructed by Troughton and Simms, of London, in the year 1838. It was obtained for the commission for the Texan boundary survey, from Messrs. William Bond and Son, of Boston, for whom it was made. The whole instrument is of brass. The azimuth circle is divided by the aid of a vernier to read to minutes. The vertical or

dip circle, is 8 inches in diameter, divided on a silver-washed surface, to read to 15 minutes of arc. But, by the aid of a magnifying lens, the readings may easily be estimated to the nearest two minutes.

In making the observations, the following method was always pursued, viz: Both ends of the needle were read with the face of the dip circle to the east, and also to the west, and with the face or marked side of the needle twice to the east and twice to the west; that is, once each way, by a change of direction of the face of the instrument, and once each way again, by a reversal of the needle on its axis. A mean of all the readings was then taken and noted. The poles of the needle were then changed, and the same course repeated, and a mean of all the readings noted. A mean of these two results was taken for the dip indicated by the needle. The same operation was then performed with the other needle, and a mean of the final results of the two needles was adopted as the magnetic dip for the station.

Care was always taken, in selecting positions for observations, both for the dip and the declination, to have them beyond the reach of influence upon the needles arising from the iron in buildings and from any other local cause. The magnets, all iron or steel belonging to the camp, were always kept remote from the instruments during the observations, and were always sent in a direction east or west (magnetic) of the instrument, in order thus to neutralize all influence upon the needles.

The close coincidence in the results of the two dipping needles, which was still exhibited after the accident by lightning to needle No. 2, described in the memoir, will serve as a striking illustration of the importance of the several reversals of the face of the instrument, of the faces of the needle, by turning their axes end for end, and of the poles. Previous to that accident, the indications of needle No. 2, were quite as uniform throughout its various positions as those of needle No. 1. After the accident, needle No. 2, always exhibited a variation in its extreme indications, arising from change of position, amounting to 10 and sometimes to nearly 12 degrees. Still the mean of all the observations made in the manner described seems to have agreed as well, or nearly as well, as before the accident, with the dip indicated by needle No. 1, which always remained in good order.

The absolute error of needle No. 2, seems to have been constant, or very nearly so, but by the several reversals of position, and of the poles, this error was rendered as often *positive* in its character, as it was *negative*, and was thus neutralized, or very nearly so.

Needle No 2 was observed upon for the last time, at West Point,

N. Y., on the 24th of August, 1840. Its place was afterwards substituted by two other needles, marked No. 3 and No. 4. They were made expressly for Major Graham, by Mr. J. M. Baur, of New York, and are of the acute lozenge shape, very similar in form to No. 2.

The needles were always charged as strongly as practicable, and generally to saturation, both when the poles were direct, and also when reversed. This is an important object in observing the dip, for the stronger the needles are charged with magnetism, the less is the effect of any want of perfect balance, or any imperceptible dust, or other particles which may adhere to them, to deflect them from the true angles of dip.

The localities occupied by the instrument, at the several stations, have been minutely described in the memoir, in order that they may be easily found by future observers, and that an exact comparison of results may be made, and the change of dip, with the lapse of time, be the more accurately ascertained.

The following are results obtained by Major Graham:

At the light-house, at the S. W. pass, mouth of the Mississippi river. Lat. $28^{\circ} 58' 50''$ N., Long. $89^{\circ} 21' 27''$ W.

On the 29th January, 1840. Dip $58^{\circ} 42'.25$.

At Dr. Everett's house, near the mouth of the River Sabine, Texas. Lat. $29^{\circ} 43' 54''$ N., Long. $93^{\circ} 51' 30''$ W.

On the 11th February, 1840, Dip $58^{\circ} 33'.65$.

On the 28th February, 1840, Dip $58^{\circ} 32'.1$.

On the 19th February, 1840, Declination $8^{\circ} 40'.1$ E.

On the 29th February, 1840, Declination $8^{\circ} 40'.3$ E.

At Gaines' Ferry, on Sabine river, Texas. Lat. $31^{\circ} 28' 15''$ N., Long. $93^{\circ} 44' 31''$ W.

On the 28th and 29th May, 1840, Dip $60^{\circ} 57'$.

On the 29th May, 1840, Declination $8^{\circ} 40'.5$ E.

At Polvido's house, on Sabine river, La. Lat. $32^{\circ} 01' 01''$ N., Long. 94° W.

On the 4th and 5th June, 1840, Dip $61^{\circ} 36'.8$.

At Natchitoches, La.

On the 26th June, 1840, Dip $61^{\circ} 15'.9$.

At West Point, N. Y. Lat. $41^{\circ} 23' 25''$ N., Long. $74^{\circ} 01'$ W.

On the 24th August, 1840, Dip $73^{\circ} 20'.09$.

At a point 4578 feet due north from the monument at the source of the river St. Croix. Lat. $45^{\circ} 57' 23''.6$ N., Long. $67^{\circ} 46' 45''$ W.

On the 18th, 19th and 20th Oct. 1840, Dip $76^{\circ} 57'.4$.

At Parke's Hill. Lat. $46^{\circ} 06' 40''$ N., Long. $67^{\circ} 46' 45''$ W.

On the 27th, 28th and 29th Nov. 1840, Dip $77^{\circ} 02'.5$.

The list of outstanding Committees on subjects of science, was read.

The list of Committees on obituary notices, was read.

On motion of Mr. Frazer, Dr. Ducatel was excused from the duty assigned him of preparing an obituary notice of Mr. Nicollet.

On motion of Dr. Dunglison, Col. Abert was appointed to prepare an obituary notice of Mr. Nicollet.

On motion of Dr. Patterson, Dr. Emerson was excused from the duty assigned him of preparing an obituary notice of Mr. Dunn.

On motion of Dr. Patterson, Mr. Eckfeldt was excused from the duty of preparing an obituary notice of Mr. Cloud.

Dr. Dunglison announced the death of the Rev. Dr. Beasley, who died at Elizabethtown, N. J., on Saturday, 1st November, 1845, in the 78th year of his age.

Dr. Bache announced the death of Mr. David B. Warden, at Paris, on the 9th October, 1845.

Also, the death of Mr. Samuel Harrison Smith, at Washington, on the 1st November, 1845, in his 74th year.

On motion of Mr. Kane, Dr. Patterson was appointed to prepare an obituary notice of Mr. Warden.

Prof. Henry, of Princeton, communicated the *result* of a series of experiments on electricity made last winter. They had reference, first, to the discharge of electricity through a long wire, connected with the earth at the farther end: secondly, to the discharge of a jar through a wire: and, thirdly, to an attempt to account for the phenomena of dynamic induction.

Prof. H. first showed, that when a charge of electricity is given to one end of a wire, the different parts of the wire become charged successively, as though a wave of electricity passed along it. He then showed that the charge passed along the surface of the wire, and not through its whole mass, as was supposed from the analogy of galvanic conduction. Hence he inferred that dynamical electricity obeys the same laws as the statical. He then detailed some experiments upon the passage of electricity through plates, and showed that when a charge was transmitted across a plate, the tension was greatest at the edges, the electricity apparently exercising a self-repelling action, while, if the charge were passed through two pieces of tin-foil, these slips attract each other.

Prof. H. believes that it may be justly inferred, from these experiments, that the attraction is due to ponderable matter, while the repulsion is due to electricity; thus showing that electricity is a separate principle, and not a mere property of matter.

Prof. Henry next passed to the subject of the discharge of a jar. It was necessary, in his experiments, to get rid of the free electricity arising from the thickness of the glass, and it occurred to him that this might be done by removing the knob, and making the coating upon the inside of less area than that upon the outside. With this arrangement, when the discharge was made through a long wire, and a test jar brought near it during discharge, a bright spark passed; but upon approaching the jar to a delicate electrometer, it gave no indications of free electricity. Reflecting upon this, and upon an experiment of Prof. Wheatstone's, Prof. H. was led to believe that the jar is discharged by two waves, a negative and a positive one, starting simultaneously from the two ends of the wire. To prove this, he broke the wire, and interposed a pane of glass dusted with red lead and sulphur; two figures of positive and negative electricity were produced. He made several other experiments tending to prove this same fact. He showed how these experiments serve to explain that of Dr. Priestley, where a spark was found to pass between the ends of a long bent wire, the ends being brought within a few inches of each other.

He next passed to the connexion between statical and dynamical induction. Statical induction has heretofore only been observed at short distances. Prof. H.'s first experiment proved that it could be observed at the distance of nineteen feet, the floor of a chamber intervening, showing that statical induction takes place at great distances, though not at so great distances as the dynamical. He then explained his views of the nature of dynamical induction. When a spark is thrown upon a wire, it passes in a wave, whose length might be determined if we knew the velocity of electricity; now, if we have another parallel wire, a negative wave will be formed in this, and the two waves will travel simultaneously in the same direction. But this is equivalent to a positive induced wave in the opposite direction. In this way the phenomena accompanying the discharge of a jar are easily explained. Again, if we conceive that in a galvanic battery the discharge consists of a series of such waves, we may very simply explain the phenomena of galvanic induction.

Mr. Justice stated, that within the last six months he had planned two observatory buildings, which, so far, had been

found perfectly complete and successful; and he called the attention of the members to the fact, that they could be erected at a much less expense than that of the High School, which cost about \$7000, while these had not cost more than \$500 or \$600 a piece. The wall was carried up until near the top (from 35 to 40 feet), and then curved inwards about 18 inches; and on it were then laid the timbers upon which the equatorial was supported. It was then carried up some 18 inches higher, and the observatory floor laid upon the same wall. The dome had been made to traverse with great facility by a very simple contrivance. Plates of boiler iron were made of a circular form, one of which was attached to the lower edge of the dome, the other laid down upon the floor. The dome traverses upon balls of iron, about seven inches in diameter.

The Committee appointed on the 5th January, 1844, to revise the By-laws and Regulations of the Society, reported a series of resolutions.

The list of Committees on business was called over.

Stated Meeting, November 21.

Present, twenty-five members.

Dr. FRANKLIN BACHE, Vice-President, in the Chair.

Letters were received and read:—

From the Royal Society of Sciences of Upsal, dated Upsal, 1st June, 1844, announcing the transmission of the 12th Vol. of their Transactions.

The following donations were announced:—

FOR THE LIBRARY.

Transactions of the Horticultural Society of London. Second Series.

Vol. II. Part VI. with Title and Index to complete the Volume.

Vol. III. Parts I. and II. 4to.—*From the Society.*

Proceedings of the Horticultural Society of London. Nos. IX. to XXI. inclusive. January 21, 1840, to December 5, 1843. 8vo.

From the same.